Landfill Gas Project in South Korea

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Agenda

- Korea Overview
- Status of Landfill in Korea
- Current LFG project
- Limits or barriers of LFG Project
- Effort to overcome barriers

Korea energy Overview

- **Rapidly developing economy, highly dependent on imported energy**
  - ➢ Dependency rate on imported energy
    : 98% (187.5 million toe)
    - ✓ Primary Energy Consumption - 192.9 million TOE in 2000 (10th in the world)
  - ➢ Total final energy consumption
    : 149.6 mill toe (2000)

<Comparison of TFES based on population & GDP>

	Canada	France	India	Italy	Korea	UK
TFES/popul (TOE/capita)	7.9	4.2	0.5	2.9	3.7	3.9
TFES/GDP (TOE/1000 US$)	0.4	0.2	1.1	0.1	0.3	0.2

Status of Landfill in Korea

- **Total number of landfill facilities in operation is 306 sites**
  - Total capacity : 416 million m^3 (29% of the capacity has been occupied)
  - Number of landfill over 1million m^3 : 33 sites (Capacity of these is 92.7% of total)
- **Each local government is responsible for *Management of these landfill***
  - 16 cities and provinces

Waste in Korea

■ Waste production & disposal in 2000

(unit: ton/day)

	Produ-ction	Disposal			
		Landfill (%)	Incineration(%)	Recycling (%)	Others (%)
Municipal	46, 438	21,837 (47)	5,440 (12)	19,167 (41)	-
Industrial	101,453	18,962 (19)	8,034 (8)	67,514 (67)	6,943 (6)
Building	78,777	10,021 (13)	2,071 (3)	66,685 (84)	-

15 Candidate Landfill for LFG utilization

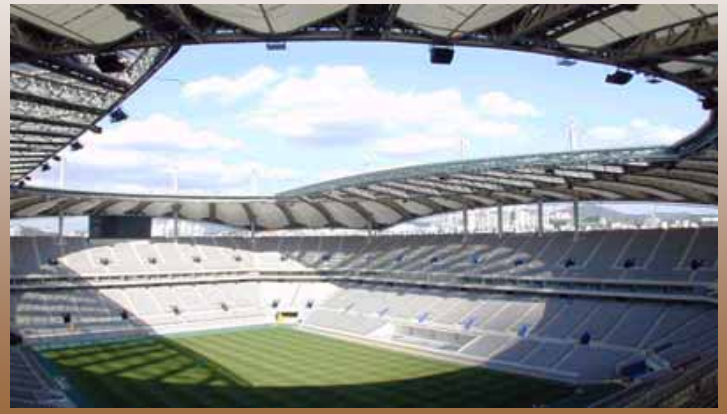
Name of landfill	Reclamation period		Total capacity of Reclamation (1000 m3)	1000 m3 of waste-in-place	LFG (m3/min)
	Start	Close			
Sudokwon	1992	2022	289, 329	53, 580	833
Busan	1996	2004	10, 486	5, 015	61
Daegu	1990	2005	9, 225	6, 402	109
Kwangju	1993	2002	4, 369	3, 267	43
Daejeon	1996	2010	8, 465	2, 085	52
Ulsan	1994	2004	4, 255	2, 297	27
Wonju	1995	2005	164	3, 140	58
Chungju	1994	2000	1, 860	1, 587	16
Mokpo	1995	2004	2, 897	1, 116	13
Pohang	1994	2001	1, 620	1, 150	14
Kumi	1990	2004	1, 932	1, 751	21
changwon	1994	2031	3, 810	1, 543	14
Masan	1995	2013	3, 254	1, 089	27
Jinju	1995	2011	5, 854	1, 012	19
Cheju	1992	2002	2, 294	1, 178	14

Current LFG Efforts in South Korea (1-1)

■ Nanjido Landfill

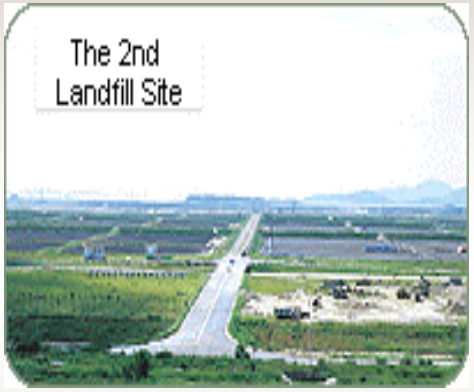
- Reclamation period : 1978 - 1993
- Waste in place : 9,100 m^3
- Utilization of LFG : Direct Gas Utilization
  (Heating & Cooling for 2002 Seoul World Cup stadium)
- Amount of LFG used for boilers : 168 m^3/min

2002 Seoul ⏩
World Cup Stadium



Current LFG Efforts in South Korea (1-2)

■ Sudokwan Landfill



The 1st Site
Size:2.8milm^2
Period:
‘92.2~2000.10
Capacity:
63 million ton

The 2nd Site
Size:2.5milm^2
Period:
2000.10~2010
Capacity:
67 million ton

The 3rd & 4th Site
Size: the 3rd-3.3milm^2
the 4th-3.9milm^2
Period: Planned after 2010

Current LFG Efforts in South Korea (2)

■ Power generation in Sudokwan Landfill

- 6.5MW generator installed
  - ✓Amount of LFG used : 66 Nm3/day
  - ✓Customer of Electricity produced
  - :Facilities in Sudokwon Landfill Site

⏩

Picture of LFG Power Plant in the Sudokwan

Current LFG Efforts in South Korea (3)

■ Busan Landfill (Sangkok)

- Reclamation period : 1996 - 2021
- Utilization of LFG : Power generation
  - ✓2.7MW power plant built by EDL in Australia and Seo-Hee in Korea
- All electricity produced is sold to Grid (KPX: Korea Power Exchange)

Limits, Barriers, and Challenges

- **Lack of experience in LFG projects** (commercial projects)

- **Technological barriers and need for fundamental R&D**
  - fundamental investigation such as production rate and production period etc

- **Institutional barriers**

Efforts to overcome barriers

- Related Regulations and Financial Assistance

☞ **Regulations !!**

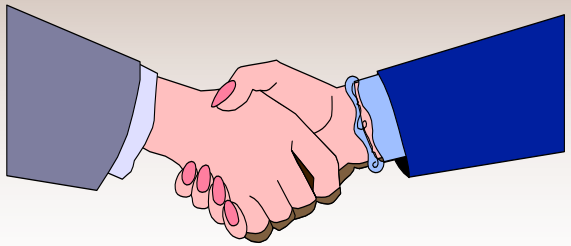
- **Waste Management Act**
- **Rational Energy Utilization Act**
- **Etc.**

☞ **Financing !!**

- **Special Account for Rational Energy Utilization**
- **Special Account for Environment Improvement**
- **Etc.**

Effort to overcome barriers - TCAPP

US EPA&DOE - NREL



Korea MOCIE -KEMCO

TCAPP

- Energy management
- **Methane recovery from organic waste**
- Waste energy recovery using heat pumps

Projects pursued under TCAPP

■ Dae-Gu Landfill Site

- Capacity : 9,225,000m^3
- Reclamation period : 1990 ~ 2005
- LFG production : 100m^3/min
- Feasibility Study : 2001.9 ~ 12
- Tender Issue (Dae-Gu City) : 2002.2
  - ✓ Design & Construction : ~ 2003.3
  - ✓ Commercial LFG Production : 2003.5

◂◂Picture of Daegu landfill site

Projects pursued under TCAPP

■ Ulsan Landfill Site

- Capacity : 4,255,142m^3
- Reclamation period : 1994 ~ 2014
- Feasibility Study : 2000. 11 ~ 2001. 1
  - ✓ Utilization of LFG : Direct gas use
  - ✓ LFG production : 33 Nm3/min
- Start for Construction : 2001.11
  - ✓ Commercial LFG Production : 2002.8

For more information

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